

901618 - Pelagic-Benthic Coupling

Week 51

1. Duane Edgington
 - a. Work to do to try to enhance images for calibration
 - b. Work to do to run Dan's program on in-air calibration images
2. Rich Henthorn
 - a. Larval sampling system fault analysis
3. Paul McGill
 - a. Did some analysis of Rover current meter data from Pulse 72. Found some issues with the data logging and got Rich H. in the loop to address them.
 - b. Looking for a Python implementation of Zhang's camera calibration algorithm so I can run images myself and perhaps avoid the steep MathWorks license fees for their MATLAB toolbox.
4. Alana Sherman
 - a. Purchasing components for Smith Macro camera

Week 50

1. Paul McGill
 - a. Did more post-cruise clean up such as sending optodes off for cal and beacon inventory.
2. Alana Sherman
 - a. Processed Rover SCOC for the previous year Oct 2019-Oct 2020.

Week 49

1. Duane Edgington
 - a. Returning to analysis of calibration images and benthic transect images
2. Rich Henthorn
 - a. Attempting to recreate the BLISS failure experienced at Sta.M here on shore

Week 48

1. Paul McGill
 - a. Working on math to do Laser Measure calibration underwater instead of in moonpool.

Week 47

1. Duane Edgington
 - a. Running matlab Computer Vision Toolbox camera calibration code, writing some matlab, and running Dan's LaserMeasure code on images collected by Paul McGill on recent P-B C dive. So far so good. Attempting to increase the number of "good" images for calibration app by enhancing the images.
2. Paul McGill
 - a. Processing Laser Measure camera calibration images from last Station M cruise. Doing calculations to feed distortion-corrected images into Dan Davis's MATLAB code.
3. Tom O'Reilly
 - a. Working with McGill to analyze results from Hotspot "loop-and-cross" geolocation runs at Station M, and to refine algorithm further based on this experience.

Week 46

1. Duane Edgington
 - a. Paul is working on the benthic in-water checkerboard calibration frame grabs from recent station M cruise
 - i. Duane to run through Matlab vision toolbox calibration program when Paul has released the frame grabs.
 - b. Dan Davis has processed the in-air laser calibration images and reports that the calibration looks good.
2. Rich Henthorn
 - a. Post-cruise unloading and data analysis
3. Tom O'Reilly
 - a. Refined and tested "loop-and-cross" Wave Glider Hotspott algorithm to geolocate Benthic Rover at Station M. Will compare accuracy and efficiency of loop-and-cross with "autoranging" script results, which was also run.
4. Alana Sherman
 - a. Helped demob Flyer after Sta. M cruise
 - b. Provided shore support as needed (not much this time)

Week 45

1. Duane Edgington
 - a. Matlab work with toolbox and calibration images
2. Rich Henthorn
 - a. At Station M enjoying surprisingly great weather all week. Heading home today.
 - b. Recovered Benthic Rover last Wednesday with a full year of operational data.
 - c. Recovered and redeployed BLISS larvae sampler Saturday morning.
 - d. Recovered Dual-Camera Tripod Saturday afternoon.
 - i. Many "stainless" hardware components on the mooring string showed signs of corrosion.
 - e. Deployed Dual-Camera Tripod Monday morning.
 - i. Deployed without sediment traps because of unreliable hardware.
 - f. Recovered Solo Camera Tripod Monday afternoon.
 - i. The window in the camera housing shattered on Sept 28, ending the mission.
 - ii. Bringing the instrument home for upgrades and repair.
 - g. Pieced together a sediment trap mooring with elements from both camera tripod moorings and deployed on Wednesday morning.
 - h. Recovered BLISS larvae sampler.
 - i. Motor housing failed at depth before sampling had begun.

Week 44

1. Duane Edgington
 - a. With Paul McGill installed 3-laser laser measure system on Doc Ricketts, and captured in-air calibration images. Images have been corrected and calibration performed.
 - b. Using matlab to perform in-water calibration of images from ROV video of checkerboard pattern.
 - c. Updated matlab to 2020b on matlab mac system.
2. Rich Henthorn
 - a. Annual Sta.M cruise started Tuesday. Great weather so far.
 - b. Deployed SES and BLISS this AM. Rover will be recovered this afternoon.
3. Alana Sherman
 - a. Packed for Flyer cruise
 - b. Loaded Flyer
 - c. Updated procedures for instrument turn around

Week 43

1. Duane Edgington
 - a. Running matlab computer vision toolbox camera calibration app on images of checkerboard taken on recent Pelagic-Benthic cruise to debug algorithm and evaluate performance
 - b. Preparing to calibrate 3 laser system on Doc Ricketts with Paul McGill Thurs-Mon Oct 22-26 for upcoming station M cruise. Pre-cruise Covid-19 test on dock Thurs Oct 22 9AM.
2. Rich Henthorn
 - a. Preparation for Sta.W cruise
 - b. Mobilization
 - c. SES acoustic comms development
3. Paul McGill
 - a. Loading ship for Flyer cruise next week. Working with Duane E. to analyze camera calibration images from last Ventana dive. Made some changes to our calibration target.

Week 42

1. Duane Edgington
 - a. Green light to purchase MatLab Computer Vision Toolbox and maintenance ASAP to support analysis of recent dive footage
 - b. Plan to do analysis as soon as license is available.
2. Rich Henthorn
 - a. SES prep for Sta.M deployment in 2 weeks.
 - b. Found source of poor SES images in the liquid solution between the lenses
3. Paul McGill
 - a. Reconfigured SES from MARS operation to autonomous mode for Station M. Troubleshoot imaging issue with SES camera. Disassembled, cleaned, and reassembled camera imaging chamber with Johnny and Rich.

Week 41

1. Rich Henthorn
 - a. Examining results of final MARS mission
2. Paul McGill
 - a. Doing frame grabs of camera calibration target video from ROV dives last week.

Week 40

1. Alana Sherman
 - a. Set up software for larval pump before Mondays deployment
 - b. Talked to the SES from shore and ran missions to test the instrument after we cleared the clogged funnel.
 - c. Tested our newest version of Snappy, our camera controller, and found some software issues.

Week 39

1. Rich Henthorn
 - a. Coaching folks to run BLISS and SES missions for next weeks MARS deployment
2. Paul McGill
 - a. Cruise prep for next Mon and Tue. Found a last-minute problem with larval pump but think we've got it resolved.
 - b. Did loop and cross algorithm testing on Wave Glider with Tom O. Discovered some issues and modified algorithm, but won't get to test until WG is at Sta. M.

3. Tom O'Reilly
 - a. Tested and refined loop-and-cross geolocation algorithm on WaveGlider tiny's Hotspot using MARS SES acoustic modem as target. Will refine software further based on test results before deployment to Station M, where algorithm will be used to geolocate Benthic Rover.
4. Alana Sherman
 - a. Trained with Rich on how to set up the larval pump and how to test the SES for next week's ROV dives.

Week 38

1. Rich Henthorn
 - a. Mission prep for SES
 - b. Final 24-hr SES test on MARS after unclogging
2. Paul McGill
 - a. Prepping equipment and setting schedule for Carson cruises at end of this month.
 - b. Fixed some issues in my ROV transect volume calculations.
3. Tom O'Reilly
 - a. Running tests of "loop-and-cross" acoustic search algorithm with Wave Glider tiny's Hotspot, using SES modem as a target. I'm working with Paul McGill, Chris Wahl, and Brian Kieft to setup and run these tests. Depending on results we may use this algorithm to geolocate locate Benthic Rover on next Wave Glider trip to Station M

Week 37

1. Rich Henthorn
 - a. The trap seems clogged beyond the ability of the instrument to correct
 - b. Plan is to use the Ventana to clear it

Week 36

1. Rich Henthorn
 - a. SES may have a clogged sediment trap as no apparent sediment is being collected
 - b. Continue to hold carousel in flow-thru position hoping clog will clear
2. Paul McGill
 - a. Troubleshoot power issues with SES on MARS.
3. Tom O'Reilly
 - a. Refining software and test plans for "loop and cross" technique for acoustic geolocation of Benthic Rover and other targets.

Week 35

1. Duane Edgington
 - a. Emails to Dan Davis and with Paul McGill
2. Rich Henthorn
 - a. Variable speed SES carousel feature to minimize sample movement on the slide
 - b. SES doesn't seem to be collecting sediment at MARS - might be clogged
3. Paul McGill
 - a. Post-cruise cleanup and data analysis. Tracked down cause of RF beacon failure on elevator.
 - b. Moved a metric crapton of lithium batteries from garage to Rover lab.

Week 34

1. Rich Henthorn
 - a. Prep and mobilize for SES and BLISS deployments at MARS

- b. Tue and Wed on Carson at MARS
 - c. Tuesday deployments of instruments went very well
 - d. Recover BLISS Wednesday
2. Paul McGill
- a. Finished tank testing of BLISS larval sampler. Based on flow data collected, was able to calculate the optimal flow rate for this week's deployment at MARS.
 - b. Finished preparing SES for deployment.
 - c. Went to sea on Carson on Tue and Wed to deploy and recover instruments.
 - d. Wrote code to geolocate Rover with Wave Glider data and worked with O'Reilly on algorithm to do loop-and-cross navigation autonomously.
3. Tom O'Reilly
- a. Working with McGill to refine 'loop-and-cross' acoustic geolocation algorithm and automated Wave Glider navigation script. We believe that loop-and-cross will be most efficient in cases where target location is known to within roughly 2 kilometers. First sea-trial is planned in a few weeks on Wave Glider 'Tiny' at MARS, using SES as a target. If tests are successful, we will use loop-and-cross to geolocate Benthic Rover at Station M later this year.
 - b. Installing software into new Hotspot payload box, preparing for Hotspot integration with Wave Glider 'Hansen', for onshore testing of loop-and-cross algorithm
4. Alana Sherman
- a. Helped team with deployments on Tuesday
 - i. Was trained on telepresence Monday, and controlling the SES
 - ii. Was shore contact and pinch-hit for Rich who was at sea with no microwave. We were able to communicate to the SES through the MARS node.

Week 33

1. Rich Henthorn
- a. SES MARS configuration setup and test on the MARS Wet-node simulator
 - b. Benthic Larvae In-situ Sampler (BLISS) setup and test
 - c. Meeting
2. Paul McGill
- a. Finished modification and reassembly of larval sampling pump. Did bench testing and addressed a few problems. Set up flow rate recording system and ran system in Test Tank to identify optimal pumping rates.
3. Tom O'Reilly
- a. Working with Paul McGill to implement the "loop-and-cross" acoustic geolocation method on the Wave Glider Hotspot. We believe this algorithm will be most efficient when we have a reasonable "fuzzy" initial guess of target location, to within a few hundred meters (e.g. for Benthic Rover at Station M). While implementing loop-and-cross I've modified and streamlined our existing Hotspot code, making it more extensible to future applications.

Week 32

1. Rich Henthorn
- a. Installed spare system microSD card in controller to address flakey behavior
 - b. Testing MARS configuration in test tank

Week 31

1. Rich Henthorn
- a. SES system microSD file system IO extremely slow during testing
 - b. Causing intermittent reboots of the control board
 - c. Spare will be installed ASAP

- d. MARS Tank Testing when MBARI reopens
- 2. Paul McGill
 - a. Got SES into Test Tank but controller is having problems so we'll have to pull it when MBARI reopens.
 - b. Finished schematics for Larval Sampler motor controller, but can't get it built until MBARI reopens.
 - c. Gave new Laser Measure calibration target specs to Mariah and she'll work on it this week.

Week 30

- 1. Rich Henthorn
 - a. SES MARS configuration prep and testing
 - b. Lots of progress but some minor networking issues remain

Week 29

- 1. Duane Edgington
 - a. Brief email exchange with Paul McGill coordinating for upcoming cruise.
- 2. Rich Henthorn
 - a. SES acoustic modem work on campus
 - b. SES tank test prep
 - c. Team meeting
- 3. Paul McGill
 - a. Got the SES rewiring completed and housings closed in preparation for next week's tank testing.
 - b. Determined specs for new camera calibration target for Laser Measure.

Week 28

- 1. Duane Edgington
 - a. Touched base with Paul McGill on 2020 plans, 2021 proposal

Week 26

- 1. Rich Henthorn
 - a. Detective work on last years SES mission failure
 - b. Implemented solutions, awaiting opportunity to test
 - c. Building utility to scan syslog for mission analysis
- 2. Alana Sherman
 - a. Reviewed proposal draft and battery spreadsheet for October's cruise
 - b. Tested son-of-snappy, Rich updated the software. Still have a list of things to test with actual hardware but only discovered one issue with reading the battery voltage.

Week 25

- 1. Paul McGill
 - a. Continuing with BLISS larval pump 1 atm motor controller design. Ordered all connectors.
 - b. Got connectors installed on SES MARS interface so I can continue testing it.
 - c. Tested battery on SES modem and thought it was good but it isn't. More testing needed.

Week 24

- 1. Rich Henthorn
 - a. Collecting electronics and equipment for hand-off and return to MBARI
 - b. Proposal discussions
 - c. SES updates
- 2. Paul McGill

- a. Working on SES refurbishment and testing of MARS interface.
- b. Tested the attempted repair of Larval Pump's Elmo motor drive that failed at 6500 psi, but it's truly dead. Now designing a 1 atm housing for our last remaining Elmo.
- c. Analyzed SES fluorometer data for Pulse 71 with our new standard fluorescence target and discovered that black Delrin fluoresces at 590 nm. Designing new protocol for establishing reference fluorescence during SES deployment.

Week 23

- 1. Rich Henthorn
 - a. Acoustic comms tools
 - b. Abstract and proposal stuff
- 2. Paul McGill
 - a. Working with John F. to refurbish SES. Tracking down equipment and docs to test MARS connection for SES. Also tracking down equipment to test larval pump motor driver with new pressure-tolerant oscillator. Hard to find stuff when people aren't at MBARI!
- 3. Alana Sherman
 - a. Weekly meeting

Week 22

- 1. Rich Henthorn
 - a. Acoustic modem automation and tools

Week 21

- 1. Rich Henthorn
 - a. Camera controller project
 - b. SES acoustic comms
 - c. Proposal abstract
- 2. Alana Sherman
 - a. Internal draft proposal review
 - b. Weekly meeting

Week 20

- 1. Rich Henthorn
 - a. Proposal meetings
 - b. Camera controller code
 - i. Further refinement
 - ii. Refactored
 - iii. Created git repo
- 2. Paul McGill
 - a. Prioritizing work for MBARI reopening next month. Developing backup plan in case pressure-tolerant motor control isn't.
- 3. Alana Sherman
 - a. Meeting with Yui regarding putting a CO2 sensor on the Rover
 - b. Weekly meeting

Week 19

- 1. Rich Henthorn
 - a. Progress on camera controller - moving functionality from older to new microcontroller

- b. Nearly ready for testing with the lights and camera - when we return to campus
- 2. Alana Sherman
 - a. Zoom meeting to review projects

Week 18

- 1. Rich Henthorn
 - a. Planning controller development effort with team members
- 2. Paul McGill
 - a. Reviewed depth-of-field testing images for Macro Camera and tried to compare them with my modeling, but more in-lab testing will be required.

Week 17

- 1. Rich Henthorn
 - a. Visited MBARI to grab camera controller hardware
 - b. Camera controller setup
- 2. Paul McGill
 - a. Got SnappyTNG camera controller code to compile with latest XC8 compiler. Also fixed problems with Rover Wakey controller code and reflashed Rover's spare.

Week 16

- 1. Paul McGill
 - a. Working on camera tripod optical calculations for a paper Crissy is writing.

Week 13

- 1. Duane Edgington
 - a. Mathworks Matlab Computer Vision System toolbox trial extended one month, to mid April
 - b. Waiting for input from Paul McGill regarding purchase. This may need to wait until we are back at Moss Landing.

Week 12

- 1. Duane Edgington
 - a. Mathworks authorized a one month extension on Matlab Computer Vision Toolkit trial license so I could continue evaluation and demonstration.
- 2. Paul McGill
 - a. Did a little work estimating Rover's location for upcoming Wave Glider visit, but will have to delay final estimate until we know when WG will be at Station M.

Week 11

- 1. Duane Edgington
 - a. Camera calibration results presented to Jim Barry by Paul McGill. At decision point on Matlab toolbox purchase.
- 2. Paul McGill
 - a. Finally tested larval sampling pump in pressure test chamber but pump failed. Ordered parts for one more test and working on contingency plans if that also fails.

Week 10

- 1. Duane Edgington

- a. Evaluated captured calibration images for DiSCO Coral Observatory Camera deploying this week using trial MathWorks Computer Vision Toolbox App. In water calibration ran smoothly; results to be presented to Jim Barry this week.

Week 9

1. Duane Edgington
 - a. Assisted Paul McGill & Alana in capturing calibration images for DiSCO Coral Observatory Camera (to deploy next week)

Week 7

1. Duane Edgington
 - a. Duane is experimenting with Matlab toolboxes (one on trial from Mathworks, another opensource from Caltech) applied to calibrating checkerboard targets underwater.
2. Rich Henthorn
 - a. Migrating Snappy project to version 5 of MPLAB.
3. Paul McGill
 - a. Wired Larval Sampler pump through pressure test bulkhead and got it spinning in preparation for upcoming pressure tests. Still working on content for Station M 30th anniversary video.

Week 6

1. Duane Edgington
 - a. Paul has identified a [paper](#) on camera calibration for Dan and Duane to read
2. Paul McGill
 - a. Collected graphics and did on-camera interview for Station M video. Working on pressure test of Larval Sampler pump, and adding a regen shunt to its controller.
3. Tom O'Reilly
 - a. Planning to integrate various acoustic geolocation software into Hot Spot for application to Benthic Rover at Station M; discussed schedule with project team.

Week 5

1. Paul McGill
 - a. Worked with Tom M. to reassemble pump for Larval Sampler, and drew schematic for pressure test setup. Tracked down schematics for SES to MARS interface and measured the length of the extension cable.